

IN THE SPECIFICATION:

Please replace paragraph number [0003] with the following rewritten paragraph:

[0003] The mathematical simulation or model is then employed to generate an actual object by building the object, layer by superimposed layer. A wide variety of approaches to stereolithography by different companies has resulted in techniques for fabrication of objects from both metallic and ~~non~~-nonmetallic materials. Regardless of the material employed to fabricate an object, stereolithographic techniques usually involve disposition of a layer of unconsolidated or unfixed material corresponding to each layer within the object boundaries, followed by selective consolidation or fixation of the material to at least a partially consolidated, or semisolid, state in those areas of a given layer corresponding to portions of the object, the consolidated or fixed material also at that time being substantially concurrently bonded to a lower layer of the object to be fabricated. The unconsolidated material employed to build an object may be supplied in particulate or liquid form, and the material itself may be consolidated or fixed, or a separate binder material may be employed to bond material particles to one another and to those of a previously formed layer.

Please replace paragraph number [0007] with the following rewritten paragraph:

[0007] Stereolithography has been applied to mass production of articles in volumes where minute component sizes are involved, and where extremely high resolution and a high degree of reproducibility of results ~~is~~ are required. By way of example, conventional stereolithography relating to semiconductor processing has been identified by the assignee and various aspects of packaging devices using such techniques are described in various patents, for example, in U.S. ~~Patent~~ Patent No. 6,524,346, U.S. ~~Patent~~ Patent No. 6,549,821, U.S. ~~Patent~~ Patent No. 6,537,482, U.S. ~~Patent~~ Patent No. 6,544,465, U.S. ~~Patent~~ Patent No. 6,529,027 and U.S. ~~Patent~~ Patent No. 6,326,698 and assigned to the assignee of the invention disclosed and claimed herein, which references are further incorporated herein by reference. In particular, while stereolithography has been used to fabricate encapsulating structures or partially

encapsulating structures, the formation of a structure on or about a workpiece beginning at a predefined location has not been described.

Please replace paragraph number [0014] with the following rewritten paragraph:

[0014] Package 201 is electrically connected to a carrier substrate by way of conductive structures 213, such as solder balls, connected to second contact pads 209 and corresponding contact pads of the carrier substrate. Package 201 is configured to be connected to a carrier substrate in an inverted, or flip-chip, fashion, which conserves real estate on the carrier substrate. It is also known in the art to connect a chip-scale package to a carrier substrate by way of wire bonds or other conductive elements. Such assemblies, packages and interposers are disclosed, for example, in U.S. Patent No. 5,719,440, issued to Walter L. Moden and assigned to the assignee of the invention disclosed and claimed herein.

Please replace paragraph number [0015] with the following rewritten paragraph:

[0015] In addition to encapsulating the interconnections between bond pads 204 of semiconductor die 202 and first contact pads 208 of interposer 206, it may also be desirable to further encapsulate other facets of chip-chip-scale package 201 including side and bottom surfaces. Suitable encapsulation techniques must be precisely applied and controlled in order to maintain tolerances for subsequent processing steps, an example of which is the application of conductive structures 213. Accordingly, there is a need for a system and method for forming a deposited layer of a determined thickness on one or more facets of an assembly with the selective deposition beginning at a defined starting surface. Furthermore, there is a need for a method and system for sensing a coating thickness and determining a starting and endpoint of a coating process.

Please replace paragraph number [0017] with the following rewritten paragraph:

[0017] In another embodiment of the present invention, a selective deposition system for depositing a material at selective locations in the X/Y plane, parallel to a major plane of a

previously formed workpiece and on the surface thereof is disclosed. The system includes a controller and a platform for ~~moveably~~ movably supporting in a Z direction, perpendicular to the X/Y plane, the workpiece during a layer by layer deposition of the material at selected locations on the workpiece surface. The system further includes a reservoir for retaining the material into which the platform may be submerged with the workpiece thereon during the layer by layer deposition process. A scanning laser configured to move a laser beam over the workpiece is responsive to the controller and exposes a portion of the material corresponding to the selective locations for a current deposition layer on the workpiece. In order to monitor the thickness and suspend any further deposition processes, at least one sensing system is responsive to the controller for determining a workpiece surface level when the workpiece is supported by the platform and for determining a surface level of the material deposited on the workpiece. It is contemplated that more than one sensing system may be employed.

Please replace paragraph number [0018] with the following rewritten paragraph:

[0018] In a further embodiment of the present invention, a method for selectively depositing a material on a workpiece is disclosed. According to the method, a workpiece is secured to a platform and the level of the top surface of the workpiece is measured to determine a starting point for depositing at least a portion of the material thereon. A portion of the material is deposited on the workpiece and an upper surface of the material ~~as deposited~~ deposited on the workpiece is measured to determine a thickness of the material on the workpiece. The depositing and measuring of the upper surface of the material continues until the thickness of the material corresponds to a preselected thickness.

Please replace paragraph number [0019] with the following rewritten paragraph:

[0019] In a yet additional embodiment of the present invention, a method for fabricating a semiconductor assembly is disclosed. A level of a top surface is measured to determine a deposition starting point of at least one semiconductor die integral with a semiconductor wafer. A layer of an encapsulant material is deposited in a predetermined form

beginning at the deposition starting point on the at least one semiconductor die. The level of an upper surface of the layer of the encapsulant material is measured as deposited on the at least one semiconductor die to ~~determined~~ determine a thickness of the material on the at least one semiconductor die. Additional layers of the encapsulant material are deposited until the level of the measured upper surface of the current layer of the encapsulant material substantially equals a predetermined thickness.

Please replace paragraph number [0031] with the following rewritten paragraph:

[0031] While the present exemplary description is drawn to applications for semiconductor wafers, applications to other electrically active or passive configurations are also contemplated wherein formation of a subsequent structure beginning at a specific surface or location of an existing structure is desired. FIG. 2 illustrates a semiconductor wafer including multiple dice having active portions thereon, in accordance with one or more embodiments of the present invention. A semiconductor wafer 10 includes a plurality of semiconductor dice 12 having corresponding active areas 14 thereon. Typically, semiconductor wafer 10 includes a two-dimensional array-like arrangement of dice 12 across an active surface 16. Accordingly, separation or “singulation” of individual ~~die~~ dice from the semiconductor wafer includes one or more initial steps for forming scribe cuts 18, 20 in respective X and Y directions along one or more surfaces, such as active surface 16, of the semiconductor wafer 10.

Please replace paragraph number [0032] with the following rewritten paragraph:

[0032] FIG. 3 depicts an assembly 30 including an interposer 22 and a semiconductor die 32 with bond pads 34 positioned on an active surface 36 thereof in, for example, one or more centrally located rows. An interposer 22 is a substantially planar member formed from, for example, semiconductor material (e.g., silicon), or any other known substrate material having a coefficient of thermal expansion (CTE) sufficiently similar to that of the material of the semiconductor die 32 and having an upper surface 23 and a lower surface 24. As illustrated in FIG. 3, interposer 22 includes an elongate slot 26 formed therethrough. Slot 26 is positioned

substantially along the center of interposer 22. Interposer 22 also includes first contact pads 28, or contacts, located proximate slot 26. Electrical traces 27 carried by interposer 22 connect each first contact pad 28 to a corresponding second contact pad 29 carried on upper surface 23 of interposer 22. As depicted, second contact pads 29 are arranged in an array over upper surface 23. As illustrated and by way of example and not limitation, two parallel strips of adhesive 38 may be placed between active surface 36 of semiconductor die 32 and lower surface 24 of interposer 22 so as to secure interposer 22 to semiconductor die 32. Intermediate conductive elements 40, which are illustrated as wire bonds but may also be any other known type of intermediate conductive elements, extend through slot 26 to electrically connect bond pads 34 of semiconductor die 32 to corresponding first contact pads 28 of interposer 22.

Please replace paragraph number [0034] with the following rewritten paragraph:

[0034] FIG. 4 is a cross-sectional view of a semiconductor device including the assembly 30 of FIG. 3, depicting an encapsulant material disposed over the top surface including the scribe cuts surrounding the semiconductor die, in accordance with an embodiment of the present invention. In FIG. 4, an assembly 50 has generally disposed thereon an encapsulant material 52 in an unconsolidated state. By way of example and not limitation, the unconsolidated encapsulant material may be applied to the upper surface 23 as well as the voids formed by the scribe cuts 18, 20 using a spin-on process commonly used for application of photoresist during a semiconductor patterning process or through the use of a stereolithographic process of applying liquefied or otherwise unprocessed or unconsolidated material across the upper surface 23 of assembly 50. Specifics regarding spin-on process are known by those of ordinary skill in the art while the stereolithographic process and an apparatus for performing the process are described in the previously incorporated herein by reference U.S. patents and and are further described below.

Please replace paragraph number [0036] with the following rewritten paragraph:

[0036] Encapsulant material 52 of assembly 50 exhibits a substantially planar surface 56. Since surface 56 may be substantially planar, the overall thickness of assembly 50 is

reduced relative to packages that employ conventional glob-top type encapsulant materials of greater ~~viscosity and viscosity~~, thus having convexly curved surfaces. In addition, when surface 56 is substantially planar, encapsulant material 52 is not as likely as a semiconductor device package with a convexly curved glob-top type encapsulant to interfere with the flip-chip connection of conductive contact pins 76 (FIG. 7) to the terminals of a higher level substrate.

Please replace paragraph number [0037] with the following rewritten paragraph:

[0037] To ensure that contacts with, for example, the second contact pads 29 may be of a repeatable and reliable nature, the thickness of the encapsulant material 52 located on the upper surface 23 should be consistently formed. For example, in a “flip chip” configuration utilizing a ball grid array contact methodology, where discrete electrically conductive elements in the form of a ball, bump, stud or pillar contacts of solder, other metals or alloys ~~or of~~ conductive or conductive filled polymer are applied to the second contact pads 29, the thickness of the encapsulant material 52 should be controlled in accordance with design specifications to enable proper placement of the electrically conductive ball contacts within apertures 54 and mounting clearance for mounting the final assembly to, for example, a printed circuit board. Prior encapsulation approaches have not measured and monitored the thickness of the encapsulant material with reference to the upper surface 23 of the workpiece such as the semiconductor die 32 of the present example. The encapsulating apparatus disclosed below provides for the measurement location of the upper surface 23 of semiconductor die 32 and the further measurement of the location of the ~~upper planar~~ surface 56 of the encapsulant material 52.

Please replace paragraph number [0038] with the following rewritten paragraph:

[0038] FIG. 5 is a cross-sectional view of a semiconductor device including the assembly of FIG. 4, depicting removal of a portion of the back or passive side of the semiconductor wafer for enabling further encapsulation of the back, or passive, side of the semiconductor wafer having one or more semiconductor-die dice thereon, in accordance with an embodiment of the present invention. On a semiconductor die, active circuitry is generally

fabricated only on one side and is largely superficial to that side. Therefore, a portion of the back or passive side 58 may be removed to form a thinned surface 62 through mechanical, chemical or otherwise to a depth 60 which at least corresponds to the thickness of the remaining semiconductor wafer located below the scribe-cut cuts 18, 20. Abrasive back-grinding and wet chemical etching are suitable techniques to effect such material removal.

Please replace paragraph number [0039] with the following rewritten paragraph:

[0039] FIG. 6 is another cross-sectional view of a semiconductor device package shown in FIG. 5, which includes an encapsulant layer formed over the partially removed back or passive side of the semiconductor wafer, in accordance with an embodiment of the present invention. In order to further encapsulate an assembly 70, an encapsulant layer 72 is formed on the thinned surface 62 and further couples to the encapsulant material 52 within scribe cuts 18, 20 which surrounds the semiconductor die 32 and the interposer 22, if present within assembly 70. The encapsulant layer 72 may be formed, after inversion of the workpiece, by encapsulation techniques similar to that described above or by more rudimentary techniques such as spin-on techniques, since the thickness dimension of the ~~encapsulation~~ encapsulant layer 72 generally does not demand as precise tolerances as those structures formed on the active side.

Please replace paragraph number [0040] with the following rewritten paragraph:

[0040] FIG. 7 is a cross-sectional view of the semiconductor device package shown in FIG. 6, of the semiconductor wafer, in accordance with an embodiment of the present invention. Electrically conductive contacts or pins 76 (e.g., balls, bumps, studs, pillars, or other structures formed from metal, conductive polymer, conductor-filled polymer, or other conductive material), are illustrated as electrically conductive ball contacts according to an exemplary ball grid array contact methodology. The pins 76 are applied to the second contact pads 29 followed by a further processing step which singulates an assembly 80 from the semiconductor wafer by performing a narrower scribe cut 82 within the previous scribe-cut cuts 18, 20 (FIGS. 2-6) which was subsequently filled with encapsulant material 52.

Please replace paragraph number [0041] with the following rewritten paragraph:

[0041] FIG. 8 is a partial view of a sensing system of an exemplary flowable material spin-on system, in accordance with an embodiment of the present invention. A spin-on thickness characterization system 90 generally ~~in~~ includes (i) a surface level sensory portion 86 for measuring the beginning surface level and monitoring the material surface level and (ii) a material application portion 88 for dispensing and distributing the material. The material application portion 88 includes a dispenser 112 and a support and spinning system 96 for providing support and controlled rotational motion for a workpiece such as semiconductor wafer 98. The surface level sensory portion 86 includes one or more sensors 92, 94 for measuring a level of surface 100 and monitoring changes in the level of surface 106 of a dispensed material 99. The level of an upper surface 100 of semiconductor wafer 98 is measured by, for example, sensor 94 comprised of a transmitter 102 and a receiver 104. The measurement of the upper surface 100 defines a reference point upon which a defined thickness of material 99, such as an encapsulant material, may be dispensed and formed.

Please replace paragraph number [0042] with the following rewritten paragraph:

[0042] The thickness or surface level of material 99 at surface 106 may be measured using the same sensor 94 when placed within a dispensed material region about the semiconductor wafer 98, or, alternatively a dedicated sensor 92 may be employed to measure and monitor the level at surface 106 of material 99. In FIG. 8, the sensor 92 includes a separate transmitter 108 and receiver 110, however, combinations of sensor componentry ~~is~~ are also contemplated within the scope of the present invention. The sensors 92, 94 are configured to transmit a signal toward the surfaces 100, 106 and to receive a reflected signal from the respective surfaces. The transmitted signal may be an energy beam selected from the group comprising a visible light beam, an ultra-violet light beam, an infrared light beam, a radio frequency (“RF”) beam, a microwave beam and an ultra-sound beam. To determine the location of the surface defining a starting point such as the surface of the semiconductor wafer or to determine the surface of the upper surface of the material which facilitates the calculation of the

thickness of the material, the reflected signal may be analyzed to determine a relative distance between the sensor and the surface.

Please replace paragraph number [0046] with the following rewritten paragraph:

[0046] FIGS. 9 and 10 depict various components, and operation, of an exemplary stereolithography apparatus, in accordance with various embodiments of the present invention. FIG. 9 is a partial view of a sensing system 120 of an exemplary stereolithography system in which a workpiece, such as a semiconductor wafer 114, may undergo application of a measurable thickness of an unconsolidated material, such as an encapsulant material. The sensing system 120 measures both the starting position or level of the upper surface 122 of the semiconductor wafer 114 and the surface level 124 of material 126. The sensory sensing system 120 includes one or more sensors 128, 130 comprised of respective transmitters 132, 134 and receivers 136, 138. The measurements from the various levels are used to form a relatively precise layer of, for example, an encapsulant material on the upper surface 122 of the semiconductor wafer 114. Changes in the relative levels of surfaces 122 and 124 are coordinated through movements in the height of a platform 140 and/or through the movement of a material displacement piston 142.

Please replace paragraph number [0047] with the following rewritten paragraph:

[0047] FIG. 10 schematically depicts various components, and operation, of an exemplary stereolithography system 150 to facilitate the reader's understanding of the technology employed in implementation of the method of the present invention, although those of ordinary skill in the art will understand and appreciate that apparatus of other designs and manufacture may be employed in practicing the method of the present invention. Various aspects of stereolithography apparatus for implementation of the method of the present invention, as well as operation of such apparatus, are described in great detail in United States Patents assigned to 3D Systems, Inc. of Valencia, California, such patents including, without limitation, U.S.-Patents Patent Nos. 4,575,330; 4,929,402; 4,996,010; 4,999,143; 5,015,424; 5,058,988; 5,059,021;

5,059,359; 5,071,337; 5,076,974; 5,096,530; 5,104,592; 5,123,734; 5,130,064; 5,133,987; 5,141,680; 5,143,663; 5,164,128; 5,174,931; 5,174,943; 5,182,055; 5,182,056; 5,182,715; 5,184,307; 5,192,469; 5,192,559; 5,209,878; 5,234,636; 5,236,637; 5,238,639; 5,248,456; 5,256,340; 5,258,146; 5,267,013; 5,273,691; 5,321,622; 5,344,298; 5,345,391; 5,358,673; 5,447,822; 5,481,470; 5,495,328; 5,501,824; 5,554,336; 5,556,590; 5,569,349; 5,569,431; 5,571,471; 5,573,722; 5,609,812; 5,609,813; 5,610,824; 5,630,981; 5,637,169; 5,651,934; 5,667,820; 5,672,312; 5,676,904; 5,688,464; 5,693,144; 5,695,707; 5,711,911; 5,776,409; 5,779,967; 5,814,265; 5,850,239; 5,854,748; 5,855,718; 5,855,836; 5,885,511; 5,897,825; 5,902,537; 5,902,538; 5,904,889; 5,943,235; and 5,945,058. The disclosure of each of the foregoing patents is hereby incorporated herein by this reference.

Please replace paragraph number [0050] with the following rewritten paragraph:

[0050] Stereolithography system 150 also includes a reservoir 154 (which may comprise a removable reservoir interchangeable with others containing different materials) of an unconsolidated material 156 to be employed in fabricating the intended subsequent object. In the currently preferred embodiment, the unconsolidated material 156 is a liquid, photo-curable polymer, or “photopolymer,” that cures in response to light in the UV wavelength range. The surface level 158 of unconsolidated material 156 is automatically maintained at an extremely precise, constant magnitude by devices, such as the material displacement piston 142 (FIG. 9) known in the art and responsive to output of sensors within stereolithography system 150 and preferably under control of controller 152. A support platform or elevator 160, precisely vertically movable in fine, repeatable increments responsive to control of controller 152, is located for movement downward into and upward out of unconsolidated material 156 in reservoir 154.

Please replace paragraph number [0051] with the following rewritten paragraph:

[0051] A structure may be fabricated on a substrate, such as a semiconductor wafer 144 disposed on platform 160. The semiconductor wafer 144 may be secured to the platform 160

through vacuum pressure, adhesive, ~~other or~~ otherwise and may be further secured thereto by way of one or more base supports (not shown) to prevent lateral movement of, the substrate relative to the platform ~~160~~ 160, particularly when a so-called "recoater" blade 172 is employed to form a layer of material on a substrate, such as semiconductor wafer 144 disposed thereon.

Please replace paragraph number [0052] with the following rewritten paragraph:

[0052] Stereolithography system 150 has a UV wavelength range laser plus associated optics and galvanometers (collectively identified as laser 162) for controlling the scan of laser beam 166 in the X-Y plane across the semiconductor wafer 144 fixed about the platform 160. Laser 162 has associated therewith a mirror 164 to reflect laser beam 166 downwardly as beam 168 toward surface 170 of semiconductor wafer 144. Beam 168 is traversed in a selected pattern in the X-Y plane, that is to say, in a plane parallel to surface 170, by initiation of the galvanometers under control of controller 152 to at least partially cure, by impingement thereon, selected portions of unconsolidated material 156 disposed over surface 170 to at least a partially consolidated (e.g., semisolid) state. The use of mirror 164 lengthens the path of the laser beam, effectively doubling same, and provides a more vertical beam 168 than would be possible if the laser 162 itself were mounted directly above surface 170, thus enhancing resolution.

Please replace paragraph number [0053] with the following rewritten paragraph:

[0053] Data from the STL files resident in controller 152-~~is~~ are manipulated to build a subsequent object such as an encapsulating layer as shown in various configurations which are illustrated in ~~FIGS.~~ FIGS. 2-7 one layer at a time. Accordingly, the data mathematically representing one or more of the objects to be fabricated are divided into subsets, each subset representing a slice or layer of the object. The division of data is effected by mathematically sectioning the 3-D CAD model into at least one layer, a single layer or a "stack" of such layers representing the object. Each slice may be from about 0.0001 to about 0.0300 inch thick. As mentioned previously, a thinner slice promotes higher resolution by enabling better reproduction of fine vertical surface features of the object or objects to be fabricated.

Please replace paragraph number [0054] with the following rewritten paragraph:

[0054] ~~Because~~ The various embodiments of the present invention build a subsequent structure, such as as an encapsulant layer, beginning at a defined surface of an existing underlying structure, an example of which is a semiconductor wafer. Therefore, the underlying structure provides the support or base structure for the underlying or subsequent structure.

Please replace paragraph number [0055] with the following rewritten paragraph:

[0055] By way of disclosure of one operational stereolithographic process configuration, the operational parameters for stereolithography system 150 are set to adjust the size (diameter if circular) of the laser light beam used to cure unconsolidated material 156. In addition, controller 152 automatically checks and, if necessary, adjusts by means known in the art the surface level 158 of unconsolidated material 156 in reservoir 154 to maintain same at an appropriate focal length for laser beam 168. U.S. Patent No. 5,174,931, referenced above and previously incorporated herein by reference, discloses one suitable level-control system. Alternatively, the height of mirror 164 may be adjusted responsive to a detected surface level to cause the focal point of laser beam 168 to be located precisely at surface level 158 of unconsolidated material 156 if surface level 158 is permitted to vary, although this approach is more complex. Platform 160 with semiconductor wafer 144 attached thereto may then be submerged in unconsolidated material 156 in reservoir 154 to a depth equal to the thickness of one layer or slice of the object to be formed, and the liquid surface level 158 is readjusted as required to accommodate unconsolidated material 156 displaced by submergence of platform 160 and semiconductor wafer 144. Laser 162 is then activated so laser beam 168 will scan unconsolidated (e.g., liquid or powdered) material 156 disposed over the surface 170 of semiconductor wafer 144 to at least partially consolidate (e.g., polymerize to at least a semisolid state) unconsolidated material 156 at selected locations, defining the boundaries of a first layer. Platform 160 is then lowered by a distance equal to a thickness of a second layer and laser beam 168 is scanned over selected regions of the surface of unconsolidated material 156 to define and fill in the second layer while simultaneously bonding the second layer to the first. The

process may then be repeated, as often as necessary, layer by layer, until the subsequent structure, such as an encapsulant layer, is completed. The number of layers required to erect the structure or object to be formed depends upon the height of the object or objects to be formed and the desired layer thickness. The layers of a stereolithographically fabricated structure with a plurality of layers may have different thicknesses.

Please replace paragraph number [0056] with the following rewritten paragraph:

[0056] If a recoater blade 172 is employed, the process sequence is somewhat different. In this instance, surface 170 of the semiconductor wafer 144 on platform 160 is lowered into unconsolidated (e.g., liquid) material ~~166~~ 156 below surface level 158 a distance greater than a thickness of a single layer of unconsolidated material 156 to be cured, then raised above surface level 158 until a substrate disposed thereon, or a structure being formed on platform 160 is precisely one layer's thickness below recoater blade 172. BladeRecoater blade 172 then sweeps horizontally over the semiconductor wafer 144 on platform 160 or (to save time) at least over a portion thereof on which one or more objects are to be fabricated to remove excess unconsolidated material 156 and leave a film of precisely the desired thickness. Platform 160 is then lowered so that the surface of the film and surface level 158 are coplanar and the surface of the unconsolidated material 156 is still. Laser 162 is then initiated to scan with laser beam 168 and define the first layer. The process is repeated, layer by layer, to define each succeeding layer and simultaneously bond same to the next lower layer until all of the layers of the object or objects to be fabricated are completed. A more detailed discussion of this sequence and apparatus for performing same is disclosed in U.S. Patent Patent No. 5,174,931, previously incorporated herein by reference.

Please replace paragraph number [0057] with the following rewritten paragraph:

[0057] As an alternative to the above approach to preparing a layer of unconsolidated material 156 for scanning with laser beam 168, a layer of unconsolidated (e.g., liquid) material 156 may be formed on surface 170 of the semiconductor wafer 144 disposed on

platform 160, or on one or more objects being fabricated by lowering platform 160 to flood unconsolidated material 156 over surface 170, over a substrate disposed thereon, or over the highest completed layer of the object or objects being formed, then raising platform 160 and horizontally traversing a so-called "meniscus" blade horizontally over the substrate, such as semiconductor wafer 144 or each of the objects being formed. Laser 162 is then initiated and a laser beam-~~168~~ 168 is scanned over the layer of unconsolidated material to define at least the boundaries of the solid regions of the next higher layer of the object or objects being fabricated.

Please replace paragraph number [0058] with the following rewritten paragraph:

[0058] Yet another alternative to layer preparation of unconsolidated (e.g., liquid) material 156 is to merely lower the semiconductor wafer 144 on platform 160 to a depth equal to that of a layer of unconsolidated material 156 to be scanned, and to then traverse a combination flood bar and meniscus bar assembly horizontally over a substrate disposed on platform 160, or one or more objects being formed to substantially concurrently flood unconsolidated material 156 thereover and to define a precise layer thickness of unconsolidated material 156 for scanning.

Please replace paragraph number [0060] with the following rewritten paragraph:

[0060] In practicing the present invention, a commercially available stereolithography apparatus operating generally in the manner as that described above with respect to stereolithography system 150 of FIG. 10 is preferably employed, but with further additions and modifications as hereinafter described for practicing the method of the present invention. For example and not by way of limitation, the SLA-250/50HR, SLA-5000, SLA-7000 and SLA-3500 stereolithography systems, each offered by 3D Systems, Ine, Inc. of Valencia, California and stereolithography systems available from Sony Precision Technology America, Inc. of Tokyo, Japan, are suitable for modification. Photopolymers believed to be suitable for use in practicing the present invention include Cibatool SL 5170, SL 5210, SL 5530 and SL 7510 resins available from Ciba Specialty Chemicals Company Inc. as well as SI-40 resin available from RPC, a wholly owned subsidiary of 3D Systems, Inc., of Bezel, Switzerland.

Please replace paragraph number [0061] with the following rewritten paragraph:

[0061] By way of example and not limitation, the layer thickness of unconsolidated material 156 to be formed, for purposes of the invention, may be on the order of about 0.0001 to 0.0300 inch, with a high degree of uniformity. It should be noted that different material layers may have different heights, so as to form a structure of a precise, intended total height or to provide different material thicknesses for different portions of the structure. The size of the laser beam "spot" impinging on surface level 158 of unconsolidated material 156 to cure same may be on the order of 0.001 inch to 0.008 inch. Resolution is preferably \pm 0.0003 inch in the X-Y plane (parallel to surface 170) over at least a 0.5 inch \times 0.25 inch field from a center point, permitting a high resolution scan effectively across a 1.0 inch \times 0.5 inch area. Of course, it is desirable to have substantially this high a resolution across the entirety of surface 170 of semiconductor wafer 144 on platform characterization system 90 to be scanned by laser beam 168, such area being termed the "field of exposure," such area being substantially coextensive with the vision field of a machine vision system employed in the apparatus of the invention as explained in more detail below. The longer and more effectively vertical the path of laser beam beams 166, 168, the greater the achievable resolution.

Please replace paragraph number [0062] with the following rewritten paragraph:

[0062] Referring again to FIG. 10, it should be noted that stereolithography system 150 useful in the method of the present invention includes the sensing system 120 of FIG. 9 which measures both the starting position or level of the upper surface 170 of the semiconductor wafer 144 and the surface level 158 of the unconsolidated material 156. The sensing system 120 includes one or more sensors 128, 130 comprised of respective transmitters 132, 134 and receivers 136, 138. The measurements from the various levels are used to form a relatively precise layer of, for example, an encapsulant material on the upper surface 170 of the semiconductor wafer 144.

Please replace paragraph number [0063] with the following rewritten paragraph:

[0063] Processing in accordance with the one or more methods of the present invention for selectively depositing a material on a workpiece, such as a semiconductor wafer 144, includes securing the semiconductor wafer 144 to the platform 160 or other support structure. The location of the top or upper surface 170 of the semiconductor wafer 144 is measured and identified as a starting or reference point upon which the formation of ~~a structures, structure,~~ such as an encapsulant, is formed. A portion of unconsolidated material 200 is deposited upon the upper surface 170 of either the semiconductor wafer 144 or a previously consolidated layer of unconsolidated material 156. A thickness of unconsolidated material may be determined by measuring the surface level 158 of unconsolidated material 156 ~~and with~~ with reference to the previously identified upper surface 170 of the semiconductor wafer. The thickness of the unconsolidated material 200 is also relative to the distance of movement of the platform 160 when submerged into the unconsolidated material 156. At least a portion of the unconsolidated material is then consolidated according to a defined pattern on the semiconductor wafer 144 or upon a previously consolidated layer on the semiconductor wafer 144. The steps of depositing, measuring and consolidating are then repeated until the thickness of the material corresponds to a desired or preselected thickness.